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Published online 2018 May 31. **Review Article**

Comfort in Patients Receiving Mechanical Ventilation: A Literature Review

Junaidy Suparman Rustam [1], Waraporn Kongsuwan [2] and Luppana Kitrungrote [2]

[1]Department of Nursing, Yarsi Health Science College, Bukittinggi, West Sumatra, Indonesia
[2]Faculty of Nursing, Prince of Songkla University, Hatyai, Thailand

[*]*Corresponding author*: Junaidy Suparman Rustam, Master of Nursing Science, Adi Negoro Street 95, Bukittinggi City, West Sumatra, Indonesia. Tel: +62-81267723914, E-mail: adhie.junaidy@gmail.com

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Abstract

Background: Comfort in patients receiving mechanical ventilation can be disturbed for many reasons. This condition may lead to negative impacts due to unmet comfort needs in patients with mechanical ventilation. Kolcaba's comfort theory described that patients' comfort may be enhanced, if the needs of comfort can be met in four contexts of comfort, including physical, psychospiritual, environmental, and sociocultural comfort. Therefore, there is a need to identify causative factors that may disturb comfort during mechanical ventilation and intervention to promote comfort while receiving mechanical ventilation.
Objective: This study aimed at reviewing the literature concerning comfort in patients receiving mechanical ventilation.
Methods: A literature review was conducted by analyzing 42 scholarly papers from year 2002 to 2016. The data were searched through Scopus, ProQuest, Elsevier/Science Direct, CINAHL, and PubMed based on PICO questions with keywords; 'comfort', 'discomfort', 'comfort need' 'patient', 'mechanical ventilation', and 'ventilator'. Relevant articles were appraised following the recommendation of the Joanna briggs institute for evidence-based nursing.
Results: Overall, 116 articles were retrieved and 42 articles met the inclusion criteria. The results presented comfort needs of mechanically ventilated patients in physical, psychospiritual, environmental, and sociocultural contexts, and interventions to promote comfort during mechanical ventilation were divided to the following three categories, pharmacological interventions, nursing care interventions, and complementary and alternative interventions.
Conclusion and Recommendation: The knowledge from this literature review can be useful for nurses and other healthcare providers to develop quality comfort care for patients dependent on mechanical ventilation.

Keywords: Comfort, Discomfort, Mechanical Ventilation, Ventilator

1. Background

Mechanical ventilation (MV) is one of the most commonly used treatment modalities to help patient recover from respiratory failure or major surgery. Approximately 71% of critically ill patients receive MV treatment (1). Although potentially life-saving, MV may create a discomfort experience in patients. Previous studies have estimated that 54% of patients, who received MV, experienced discomfort (2). Comfort during ventilation can be disturbed for many reasons, such as pain, anxiety, environmental noises, and loneliness (3, 4). If nurses and healthcare providers do not manage this condition effectively, it could lead to feeling of panic, depression, agitation, and delirium (5). These may result in unplanned extubation (6).

According to the theory of comfort by Kolcaba (7), it was described that patients may feel comfort if their needs can be met in four context of comfort, namely 1, physical comfort, which refers to the outcome of individual reaction to an illness, whether it can be created by the stimulus or not; 2, psychospiritual comfort, which relates to internal awareness including self-esteem, identity, sexuality, life meaning, and one's understood relationship to a higher order or being; 3, environmental comfort, which is associated with the external surroundings and conditions of patients such as light, noise, heat, and safety; and 4, sociocultural comfort, which refers to interpersonal, family, and societal relationships (7).

Malinowski and Stemler stated that comfort is an inherent component of basic human needs, and an outcome in nursing care. The importance of comfort in nursing care is part of the healing process and it is an essential element of holistic care and culture care (8). Patients' comfort may increase, if the needs of comfort can be met by appropriate interventions (9). Therefore, it is necessary to review and synthesize the knowledge from existing evidence regarding comfort needs and intervention to promote comfort in

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patients with MV.

2. Objectives

This article aimed at reviewing comfort of patients receiving mechanical ventilation, and to investigate interventions to promote comfort during mechanical ventilation.

3. Methods

A literature review was conducted through electronic databases, including Scopus, ProQuest, Elsevier/Science Direct, CINAHL, and PubMed. Two guiding questions were created based on the PICO format; patient population (P), intervention or issue of interest (I), comparison intervention or issue of interest (C), and outcome of interest (O) (Table 1). The literature published in English language in year 2002 to 2016 was searched with keywords; 'comfort', 'discomfort', 'comfort need', 'patient', 'MV', and 'ventilator'. All of these keywords were mixed in different combinations.

The inclusion criteria were articles that explored comfort need and interventions to promote comfort in patients with MV with no restriction to any study design. Of the 116 articles retrieved, there were 42 relevant articles that met the inclusion criteria as presented in the Table 2. The critical appraisal and data extraction were done following Joanna Briggs Institute for the level of evidence (10).

4. Results

4.1. Comfort Needs in Patients with MV

Comfort needs can be associated with causes of comfort change in mechanically ventilated patients during their treatment. From the literature, some major causes were identified that could influence or disturb comfort needs in patients receiving mechanical ventilation that can be categorized based on four contexts of comfort of the Kolcaba's theory of comfort (7), including physical, psychospiritual, environmental, and sociocultural comfort needs.

4.1.1. Physical Comfort Needs

Several causative factors that occurred during mechanical ventilation can be associated with the destruction of physical comfort needs. Evidences showed that patients with MV often reported pain as a significant stress event due to the presence of an endotracheal tube (ETT) in intubation procedures (5, 11, 12). Pain was most correlated with patients' comfort (12). Pain is an important problem and a common distressing symptom in patients with mechanical ventilation due to several causes, such as their underlying health condition, catheter or endotracheal tube insertion, or body restraint because patients are immobile. Moreover, patients with mechanical ventilation also experienced pain related to procedures performed by the healthcare team, including medical examination, nursing care, and transportation (11).

A study by Grap et al. (5) found that movement of ETT increased discomfort even when the tube was well secured. Moreover, the complications of ETT, including oral irritation, ulceration, fungal infection, hyper salivation, and tracheal or laryngeal trauma indicated discomfort. The presence of the ETT for even four hours could damage a patient's trachea (5).

The physiological response of pain is mostly adverse. It may lead to unstable hemodynamic status, alteration of the immune system, hyperglycemia, and increase of catecholamine, cortisol, and antidiuretic hormones. In addition, pain has an impact on psychosocial effects, such as anxiety, depression, delirium, and disorientation (1).

Thirst and dry mouth were also reported as commonly experienced sources of physical discomfort (13, 14). Landstrom et al. (13) mentioned that the feeling of thirst among patients with MV could be attributed to several conditions, such as dehydration, electrolyte disturbance and the use of various medicines. Sometime after discharge, patients recall stressful memories of experiencing thirst. Tombes and Galluci (14) reported that 35% of patients with ventilator treatment complained about a dry mouth and thirst, and they felt suffering during their treatment. Furthermore, the use of an endotracheal tube and tape, mouth props and suctioning devices increased the risk of oral lesions developing in ventilated patients and became a source of irritation (15).

Another disturbing factor of physical comfort needs can be related to the accumulation of sputum resulting from the presence of the artificial airway. The presence of intubated MV may decrease patient's ability to cough and lead to an increase of secretion formation in the lower tracheobronchial tree (3). This condition also increases risk for an obstructed airway, atelectasis, pneumonia, and infection (3).

4.1.2. Psychospiritual Comfort Needs

Psychological distress was related to anxiety as the major disturbing factor (16). Based on the concept of the comfort theory, the experience of anxiety can be classified as a psychospiritual detractor from comfort (17). Patients with MV often have adverse experiences due to anxiety, such as the constriction of arteries and airways in the lungs (18). Moreover, changes in vital signs, including the elevation of

Table 1. Clinical Questions Based on the PICO Format

Question Type	Definition	Format
Comfort	To investigate comfort of patients with mechanical ventilation	P, Patients with mechanical ventilation; I, Patients' comfort; C, -; O, Factors related unmet comfort
Intervention	To determine the best intervention to promote comfort in patients with mechanical ventilation	P, Patients with mechanical ventilation; I, Comfort care in MV patients; C, Hospital setting; O, Effective intervention to promote comfort

Table 2. Summary of Search Results from Databases

Database	Keywords	Numbers of Research	Numbers of Relevant Research
Scopus	Comfort and mechanical ventilation	28	8
Elsevier/Science Direct	Comfort and ventilator	24	12
ProQuest	Comfort need and ventilator	14	2
CINAHL	Discomfort and mechanical ventilation	32	8
PubMed	Patients comfort and ventilator	18	11

heart rate, blood pressure, and respiratory rate may be associated with the experience of anxiety in patients with MV (19, 20).

The incidence of anxiety is described by patients as a subjective experience of apprehension or tension imposed by the expectation of danger or distress, necessitating the need for special action (Kelly, 1980 as cited in Chlan, et al., 2013). In general, anxiety can be described as an emotional state involving subjective feelings of tension, apprehension, nervousness, and worry (21). Anxiety can also be defined as a feeling of dread, fear, and/or lack of control as a normal or protective response to a perceived threat of hemostasis. Therefore, nurses need to identify anxiety in patients with MV and decide what can be done to relieve it (18). Prevention of anxiety essentially involves an awareness of life stresses and the ability to cope with them (22). If anxiety occurs, there are various interventions for decreasing anxiety, such as relaxing music therapy (21, 23).

Psychospiritual comfort in patients with MV can be disturbed due to the alteration of communication. Inability to communicate verbally while being mechanically ventilated is a source of great stress for patients with MV (24, 25). They also reported feelings of vulnerability and powerlessness during their treatment because they were unable to communicate effectively (26).

Nilsen et al. (27) reported that patients, who required intubation in MV resulted in a loss of voice and a consequent complex of communication needs. Similarly, Nelson (28) found that 90% of patients with ventilation support reported that their highest level of discomfort was due to difficulty in communication during MV. Communication difficulties or inability to speak may create and lead to psycho-emotional distress symptoms, which are the tendency towards depression, anxiety, frustration, fear and anger, panic, sleep disorders, decreased self-esteem, and loss of control (29). Because of the fact that it is always difficult for patients to communicate with the nurse or medical staff, patients' need or complaints cannot be handled correctly by the nurse and medical staff (30).

4.1.3. Environmental Comfort Needs

Most patients with MV are admitted to an intensive care unit (ICU). Here, patients were exposed to several distractions at ICUs, such as being connected to various devices, a noisy environment, unsettling alarms, uncomfortable lighting, and smell. These environments lead to decreased level of comfort (3, 26, 31). Review of studies by Kamdar et al. (32) reported that ICU noises were identified as significant disruptors of environmental comfort for patients and included staff conversations, alarms, overhead pagers, telephones, and televisions.

Moreover, patient care activities, including patient assessments, vital sign monitoring, equipment adjustment, medication administration, phlebotomy, radiographs, wound care, transportation, and bathing were also disruptors of environmental comfort as well as ICU light levels, which play a vital role in the synchronization of the cardiac rhythm of the patients (33).

The detractor of environmental comfort could result in the incidence of sleep disorders among patients with MV (26, 31-33). Sleep has been shown to be therapeutic on patients' healing and recovery. It has a positive influence on patient blood pressure, the experience of pain, and emotional wellbeing (31). Matthews (33) reported that sleep disorder were documented in 39% of patients involved, possibly indicating an increased discomfort during MV.

4.1.4. Sociocultural Comfort Needs

The context of sociocultural comfort needs of patients on MV has been integrated with family and social support. Lombardo et al. (4) found that family participation in care activities was almost always planned in patients with MV, with the consideration that family participation could be very useful or essential to the patient's well-being. Thus, restricting visits from loved ones is also a source of patient discomfort. These conditions can make patients feel lonely during their treatment (4, 24).

4.2. Intervention to Promote Comfort During MV

Many studies have been conducted to promote comfort during MV as shown in Table 3. Based on reviewed literature from research studies and some clinical practices or guidelines of discomfort management in patients with mechanical ventilation, interventions to promote comfort during mechanical ventilation can be classified as pharmacological interventions, nursing care interventions, and complementary and alternative interventions.

4.2.1. Pharmacological Interventions

Five studies reported that pharmacological interventions can be addressed to promote comfort during receiving mechanical ventilation. The use of analgesics and sedative therapy have become the standard of care at the ICU to relieve discomfort and improve patient tolerance to MV in a humane manner (6, 26). Analgesics combined with adequate sedation has been shown to increase patient comfort and reduce stress response as well as the duration of MV and ICU length of stay (34). Another two studies also reported that analgesic and sedation therapy significantly reduced discomfort in patients with MV (4, 35). In contrast, the use of sedative and analgesics did not significantly protect patients with complex-mixed discomfort (45).

Moreover, a study by Grap et al. was conducted to describe the relationship between physiological sedation stability and comfort during a 24-hour period in patients receiving mechanical ventilation. The researchers found that most patients (42%) spent the majority of their time in deep sedation. Patients with less movement were associated with greater levels of sedation, even though all patients spent the vast majority of their time with no arm movement or leg movement (6).

4.2.2. Nursing Care Intervention

Following patient assessment and safety checks, consideration of nursing care interventions to promote patient comfort and well-being needs to be addressed (26). The management of nursing care of patients with MV was challenged on some levels, such as involving highly technical skills, and requiring advanced knowledge on invasive monitoring (36). Effective nursing care that can promote comfort and reduce discomfort during ventilator treatment includes positioning, mouth care, and management of stressors, such as ineffective communication, sleep disturbance, and isolation (26). Nurses deliver high quality care by using relevant technologies and psychosocial care measures (34). Based on these evidences, the authors highlighted four nursing interventions that could be applied to promote comfort in patients receiving mechanical ventilation as described below:

4.2.2.1. Positioning

Positioning in patients with MV can improve patient comfort and also address physiological aims of optimizing oxygen transport and reducing the level of myocardial workload (26). Two studies reported that positioning can promote comfort during MV (37, 38). Thomas et al. (37) suggested that lateral positioning in MV patients with stable hemodynamics may increase comfort and reduce the incidence of ventilation acquired pneumonia (VAP). Similarly, Bonten reported that semi-recumbent positioning of a ventilated patient with the head of the bed elevated from 30 to 45 degrees significantly improved oxygenation and ventilation and also reduced VAP in patients with MV. The improvement of oxygenation and ventilation may influence the reduction of discomfort and promotion of comfort in patients with MV (38).

4.2.2.2. Suctioning

Endotracheal suctioning is a component of bronchial hygiene therapy in MV and involves mechanical aspiration of pulmonary secretions from a patient with an artificial airway in place (26). In patients with MV, who are unable to mobilize their secretions, there may be a need to suction secretions from the oropharynx and/or trachea in order to maintain airway clearance (5). Jones stated that suctioning may increase patient comfort during ventilator treatment. This may be done through an endotracheal tube, tracheostomy tube or through the nose or mouth into the trachea. Although each procedure is slightly different, indications, supplies, procedures, and risks are similar (15).

4.2.2.3. Mouth Care

Evidence-based practice by O'Reilly (40) showed that good oral care is required to avoid possible complications, such as nosocomial infections, and to promote both physical and psychological comfort in patients with MV. Similarly, a study by Grap and Munro found that frequent mouth care has been reported to significantly increase patient comfort and suggested performing mouth care every two to four hours to improve oral hygiene (6).

Table 3. Interventions to Promote Comfort During MV

Authors	Pharmacological Interventions	Nursing Care Interventions				Complementary Interventions
		Positioning	Suctioning	Mouth Care	Effective Communication	
Urden, 2006 (34)	√					
Ma et al., 2010 (35)	√					
Grap et al., 2012 (6)	√					
Couchman et al., 2007 (36)		√	√	√		
Coyer, et al., 2007 (26)	√	√	√	√	√	√
Thomas et al., 2007 (37)						
Bonten, 2003 (38)		√				
Jones et al., 2004 (15)			√			
Martensson, 2002 (39)	√	√	√	√	√	√
O'Reilly, 2003 (40)				√		
Grap et al., 2002 (5)			√			
Tracy, 2011 (41)					√	
Grossbach, 2011 (24)					√	
Otuzoglu, 2014 (42)					√	
Martensson, 2002 (39)					√	
Chlan, 2013 (16)						√
Almerud et al., 2003 (43)						√
Han et al., 2010 (44)						√
Han et al., 2010 (44)						√
Besel, 2006 (23)						√

4.2.2.4. Effective Communication

Tracy and Chlan (41) mentioned that nurses commonly use positive body language, friendly facial expression, eye contact and touching to reduce patient distress during MV treatment. Two studies of communication methods described non-vocal communication techniques, including gesture and mimics, lip-reading, eye contact, and touching to communicate with the patients with MV (27, 42). Similarly, Martensson and Fridlund (39) mentioned that another option, which can be used as a communication method in patients with MV is pen and paper. This method is always a great strategy for the nurse and patient to be able to communicate with each other.

However, most of the strategies used augmentative and alternative communication (AAC) strategy during MV treatment. The American speech language hearing association defines augmentative and alternative communication as any method used as a means of communication when oral speech cannot be achieved (24).

The context of AAC strategies includes all forms of communication that are used to express thoughts, needs, wants, and ideas when an individual has a communication barrier that inhibits the potential to meet patients' need of daily communication through natural communication (46). These strategies can be categorized in three parts: no technology strategies, such as gesture, facial expression, and head nods; low technology strategies including drawing, writing, and point to alphabet board; and high technology strategies that use communication devices, such as scan-spell, electrolarynx, supertalker, TechSpeak, E-Talk, etc. (24, 39, 47).

4.2.3. Complementary and Alternative Interventions

Complementary and alternative therapy has been used to promote comfort in patients with MV, such as relaxation massage, therapeutic touch and emphatic physical contacts (48), and music therapy (23, 49). Complementary therapies might be an important alternative or adjunct to pharmacological intervention to treat symptoms of discomfort in patients with MV (41).

Music therapy was commonly used in nursing practice as an effective intervention and an integral part of the plan for patient care (50). As a non-pharmacologic intervention, music has been used to relieve pain and anxiety and also to promote comfort in patients with MV (16, 23, 43, 44). The effect of music can influence emotions through pitch and rhythmic vibrations that have effects within the limbic system, where it can produce pleasant memories to sensory stimuli (44).

5. Conclusion

It can be concluded that comfort needs can be associated with physical, psychospirirtual, sociocultural, or environmental detractor from comfort during MV treatment. Interventions to promote comfort include pharmacological, nursing care, and complementary interventions that can be addressed to prevent the negative impacts of decreased comfort and promote comfort during MV. Nurses and other healthcare providers can use the knowledge of this literature review as guidance to develop a quality comfort care for patients receiving MV based on comfort needs.

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